9. Other Topics
9.1 Mesh Parameterization

- Generate a 2D isomorphing triangulation for a 3D mesh
Texture Mapping

• Mapping a texture onto surface
Mesh Parameterization

- Texture mapping
9.2 Texture Synthesis

- Synthesizing surface texture from a given small texture sample

Input Texture Sample + Input Mesh → Result
Texture Synthesis

Non-uniform

Uniform
Texture Synthesis

Feature aligned
9.3 Shape Correspondences

- Given $n$ input shapes, search for a meaningful relation $R$ between their elements
Registration $\neq$ correspondence

- Registration: to bring several (partial) shapes to (almost) exact alignment, rigidly or non-rigidly
- Correspondence: no repeated geometry expected
Why is correspondence hard?

- Given $n$ input shapes, search for a meaningful relation $R$ between their elements.
More challenging

- What is an arm-rest?
9.4 Mesh Morphing

• Given two objects produce sequence of intermediate objects that gradually evolve from one object to the other
  – Interpolate object shapes
Mesh Morphing
Mesh Morphing

High genus morphing (torus & mug)
9.5 Shape Completion

- Filling holes in surface
9.6 Remeshing

• Given an input mesh, generate another mesh
  – Good element quality
  – Approximating well the input
9.7 Symmetry Analysis

• Symmetry everywhere
Symmetry Research in Graphics

• Symmetry descriptor

• Symmetry detection

• Symmetry aware geometry processing
  – [Golovinski et al. 2007, Mitra et al. 2007]
9.8 Shape Retrieval
Shape Analysis

• Shape descriptor
• Local features
• Symmetry
• Segmentation
• ...

• Very hot topic!
10. Conclusions
Pipeline

Input Data
- Range-Scan
- CAD
- Tomography

Parameterization
- Simplification for complexity reduction
- Remeshing for improving mesh quality
- Freeform and multiresolution modeling

Removal of topological and geometrical errors
- Analysis of surface quality
- Surface smoothing for noise removal
Difficulties in DGP

- Arbitrary topology
- Irregular sampling
- Complex geometric details
Geometric Modeling and Processing

- Numerous research papers
- A bunch of hot topics
- Lots of challenges
- ...

Automatic  →  Interactive
Thank you!